Sept. 1, 1970 J. C. DAWSON ET AL 3,526,345

CANISTER TAP

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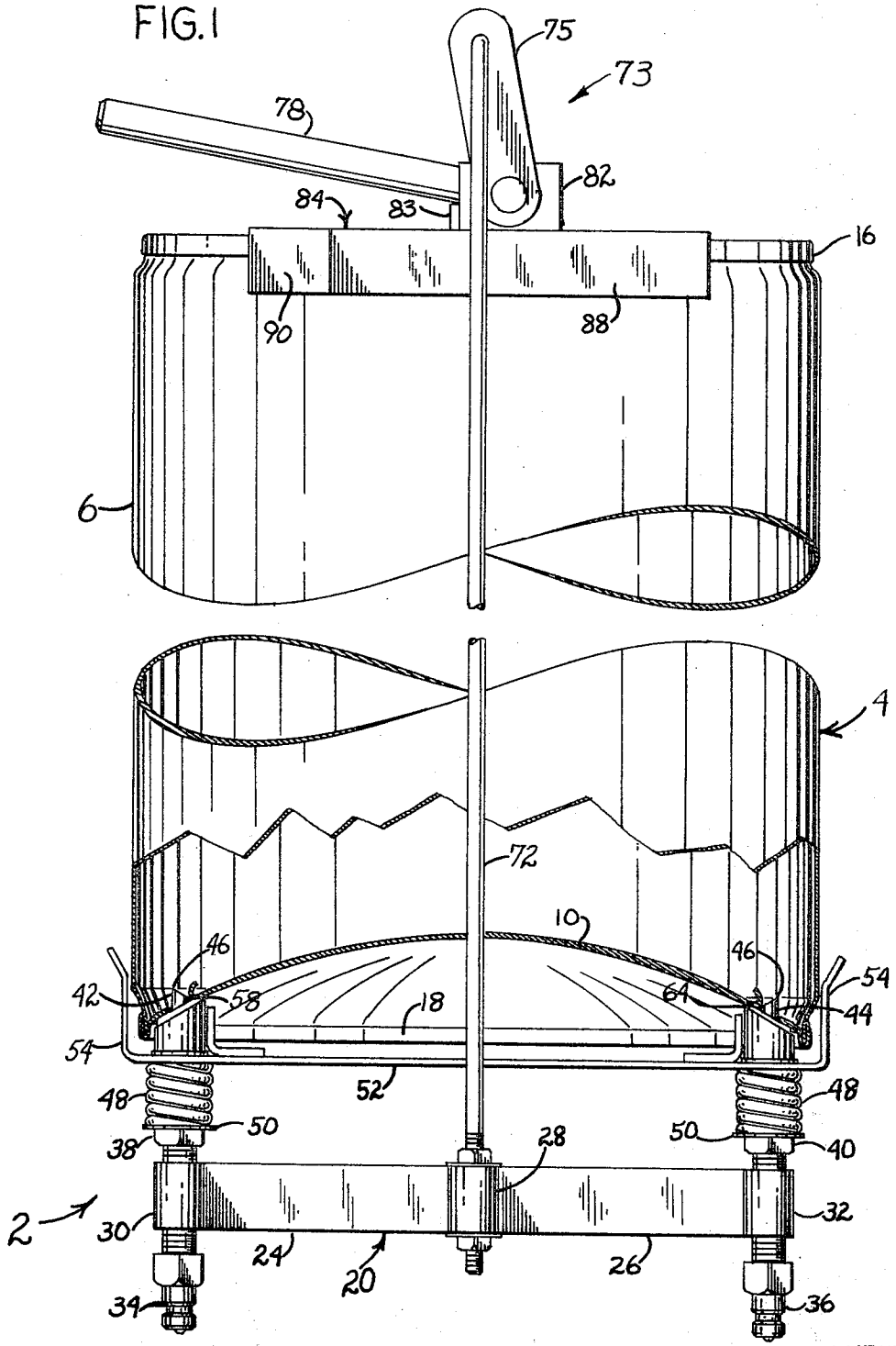
FIG. 1



INVENTORS:
JOSEPH CARL DAWSON
JAY B. BROWN
EUEL C. PRYOR
BY:
ATTORNEY

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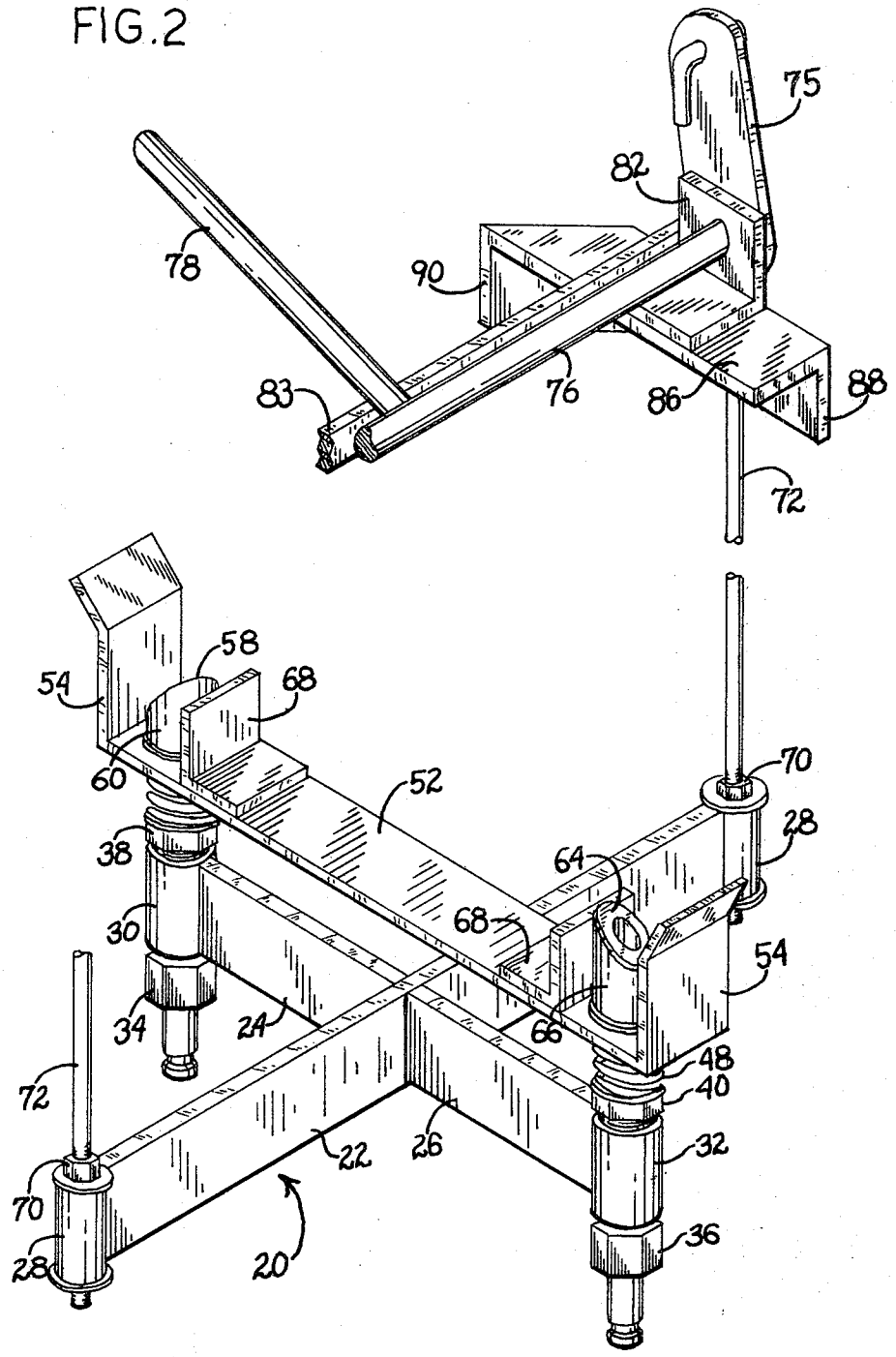
FIG. 2



INVENTORS:
JOSEPH CARL DAWSON
JAY B. BROWN
EUEL C. PRYOR
BY: John D. Pope III
ATTORNEY

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CANISTER TAP

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FIG. 3

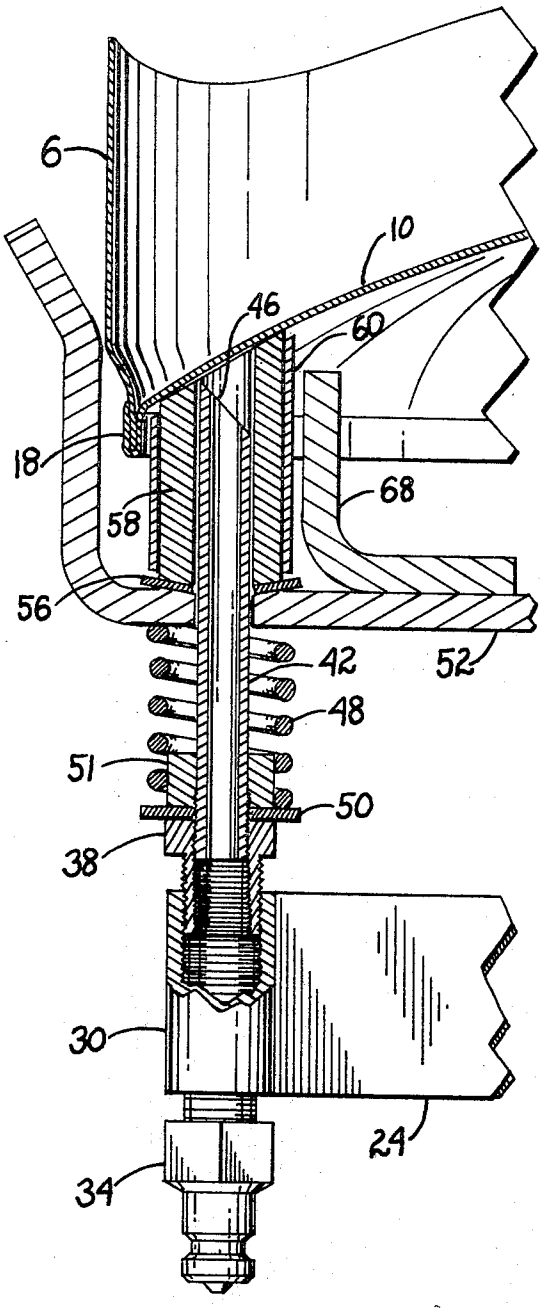
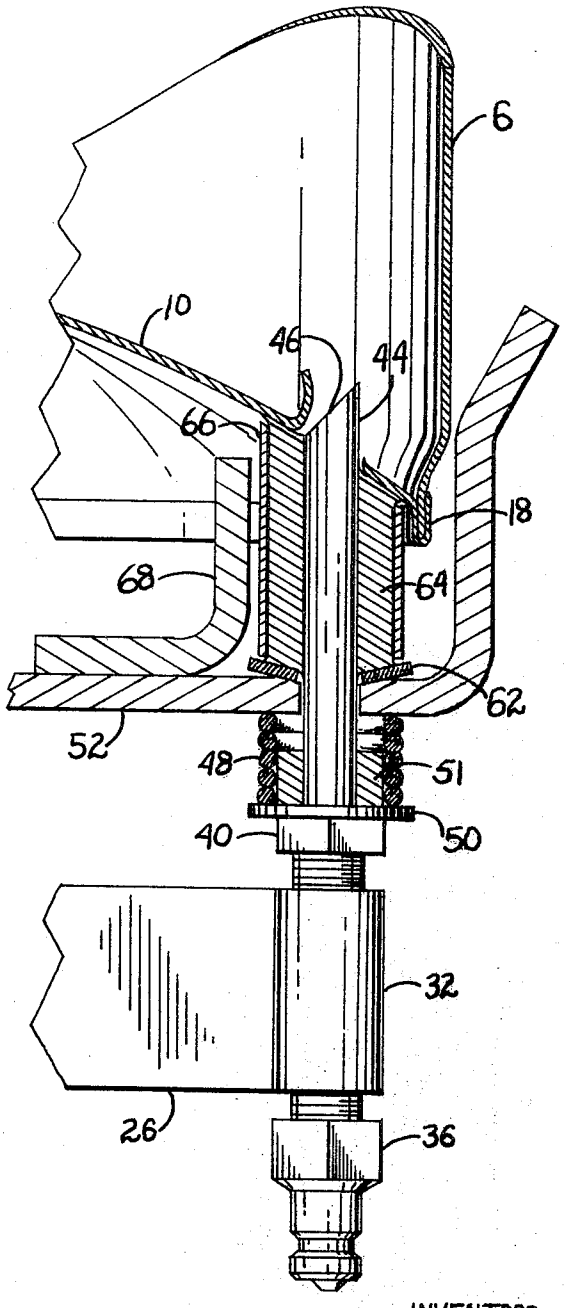


FIG. 5



INVENTORS:
JOSEPH CARL DAWSON
JAY B. BROWN
EUEL B. PRYOR
BY:
ATTORNEY

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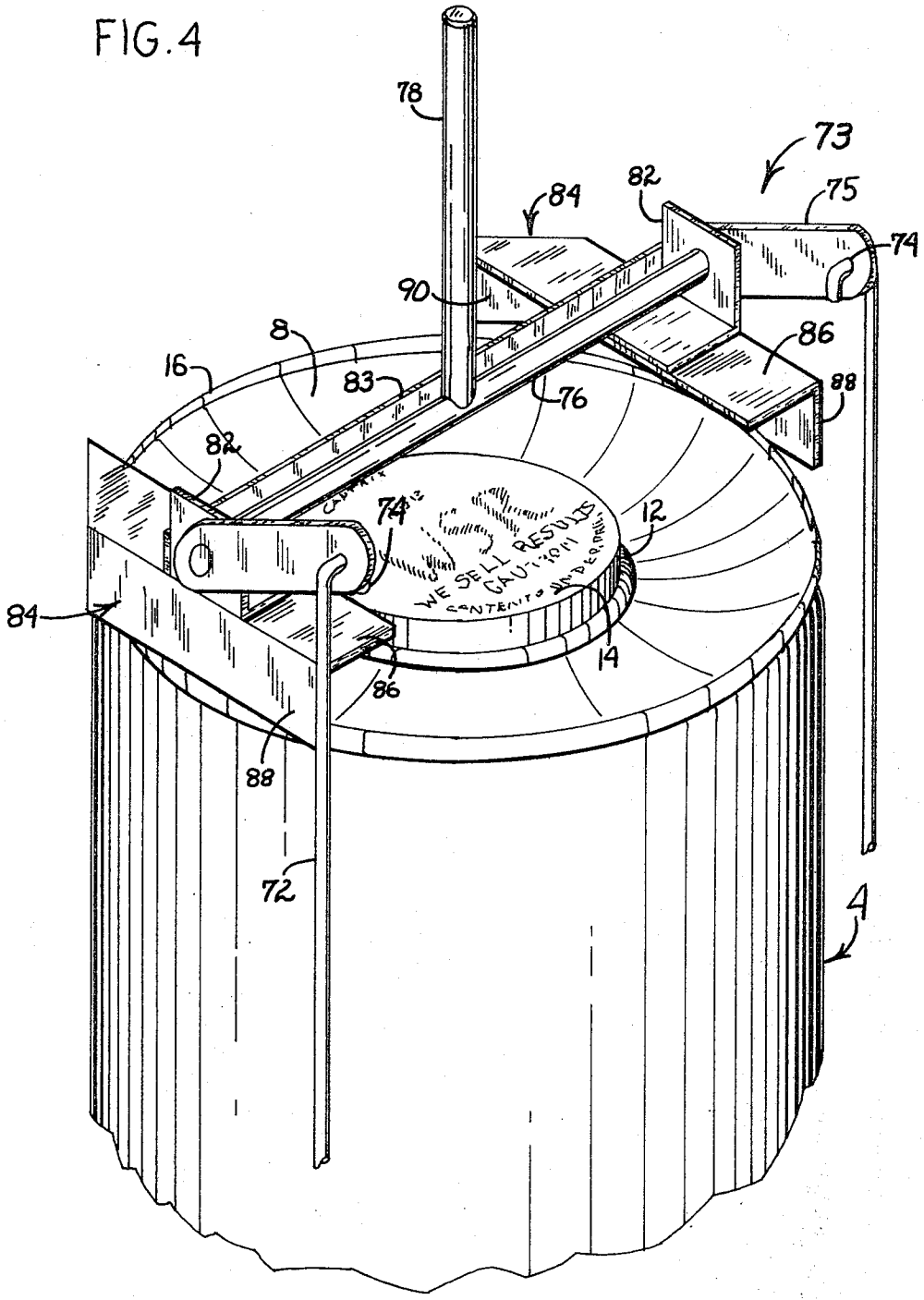
FIG. 4



INVENTORS:
JOSEPH CARL DAWSON
JAY B. BROWN
EUEL C. PRYOR
BY:
John D. Pope III
ATTORNEY

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CANISTER TAP

Joseph Carl Dawson, Jay B. Brown, and Euel C. Pryor, all of 93 Ford Lane, Hazelwood, Mo. 63042

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Int. Cl. B67b 7/24
U.S. Cl. 222—83.5 12 Claims

ABSTRACT OF THE DISCLOSURE

A canister tap having a pair of upwardly projecting pipes provided with beveled cutting edges adapted to engage the bottom wall of a canister. A lever-operated drive assembly forces the canister downwardly against the pipes so that the cutting edges cut through the canister's bottom wall. Spring-loaded elastomeric bushings encircle the upper ends of the pipes and sealingwise engage the bottom wall in surrounding relation to the punctures. A nondeformable sleeve embraces each bushing to prevent deformation of the bushing under elevated pressure conditions within the canister.

This invention relates in general to canister taps and, more particularly, to a dispensing device for withdrawing the contents of canisters by puncturing the canister wall.

Fumigant and other canisters are tapped customarily through their bungholes which are normally located in the center of their top walls. While the location of these bungholes is generally ideal for purposes of filling the canisters, this location presents problems in withdrawing the contents. For example, if a conventional spigot is used, the canister must be inverted after the spigot is installed. If the canister is pressurized so that the contents will be expelled through the bunghole, even with the canister in an upright position, the possibility always exists that some of the contents may escape and strike someone in the face. Consequently, in the case of canisters containing fumigants and other highly toxic liquids, users are reluctant to tap and pressurize such canisters through their bungholes when they are in an upright position.

Heretofore a tapping device has been marketed which punctures the side walls of cylindrical canisters by tightly embracing the selected canister and driving a beveled pipe through the canister side wall adjacent its bottom margin. Usually an elastomeric seal is disposed immediately to the rear of the pipe's cutting edge and this seal is compressed against the canister's outwardly presented surface so as to seal the margins of the puncture. This type of tap is suitable for canisters in which the internal pressure does not exceed approximately twice that of the atmosphere. At higher pressures, however, they leak. Moreover, canisters capable of withstanding higher pressures normally have relatively thick seams comprising multiple folds of metal. To use the embrasive-type tapping device previously described on such a canister would require puncturing the canister wall above the seam where it is comparatively weak and susceptible of collapsing, and even if it could be tapped at such a point a considerable volume of the contents would remain in the canister below the point of the puncture. Furthermore, it is often desirable to pressurize the interior of canisters so that the fluid can be dispensed above the fluid level in the canister or at a greater rate of flow than could otherwise be obtained by

relying on gravity or internal pressure. In such a case two punctures must be made in the canister side wall—one for the canister fluid to exit and one for the pressurizing fluid. The embracive-type of tap, however, does not adapt itself well to providing double punctures.

Among the several objects of the present invention may be noted the provision of a canister tap capable of feeding a pressurizing fluid into the canister and withdrawing the canister contents at the same time; the provision of a canister tap which reduces manual effort and problems involved in tapping a canister to a minimum; the provision of a canister tap which is safe to use with highly toxic fluids; and the provision of a canister tap which is simple and rugged in construction and easy to manufacture. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a side elevational view of a canister retentively engaged by a canister tap constructed in accordance with and embodying the present invention;

FIG. 2 is a fragmentary perspective view of the canister tap;

FIG. 3 is a fragmentary sectional view showing the supply pipe immediately prior to puncturing the bottom wall of the canister;

FIG. 4 is a fragmentary perspective view of the drive assembly forming part of the present invention; and

FIG. 5 is a sectional view showing the discharge pipe projecting through the bottom wall of the canister.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now to the drawings, **2** designates a canister tap for tapping a canister **4** having a cylindrical side wall **6** and concave top and bottom walls **8**, **10**, the former of which is centrally provided with a threaded bunghole **12** having a bung **14** fitted therein. Top and bottom walls **8**, **10**, are securely attached to side wall **6** along upper and lower rim-forming seams **16**, **18**, which are set slightly inwardly from the outwardly presented cylindrical surface of side wall **6**. Seam **18** is overlapped and rolled into the configuration illustrated in FIG. 3 and 5, as is seam **16**. Canister **4** is similar to the canister disclosed in our copending application Ser. No. 658,827, filed Aug. 7, 1967, and while it represents the preferred canister for use with the tap of the present invention, it should be understood that tap **2** is suitable for use on other types of canisters also.

Turning now to FIGS. 1 and 2, canister tap **2** includes a base frame **20** consisting of a flat cross-member **22** having a pair of opposed lateral members **24**, **26**, welded to and extending perpendicularly from the midpoint thereof. At its ends, member **22** is provided with upstanding sleeves **28**, while members **24**, **26**, are provided at their ends with threaded sleeve-type couplings **30**, **32**, respectively, the axes of which extend upwardly when canister tap **2** is in the position shown in FIG. 1. Threaded into the lower ends of couplings **30**, **32**, are quick-connect male supply and discharge couplings **34**, **36**, which are adapted for detachable connection to flexible fluid lines (not shown). The upper ends of cou-

plings 34, 36, threadedly receive bushings 38, 40, which carry upstanding hardened steel supply and discharge pipes 42, 44, having inwardly beveled upper cutting edges 46. Encircling pipes 42, 44, are coil springs 48 which bear against bushings 38, 40, through washers 50.

Springs 48, which are maintained concentric to pipes 42, 44, by spring retainers 51, carry a floating bracket 52 which is apertured near its ends for reception of pipes 42, 44, so as to permit axial shifting movement of bracket 52 on pipes 42, 44. At its ends bracket 52 turns upwardly in the provision of a pair of upstanding lips 54 which are spaced apart a distance slightly greater than the diameter of side wall 6 of canister 4. The extreme upper ends of lips 54 are turned outwardly at a slight inclination. Pipes 42, 44, project upwardly beyond the upper surface of bracket 52 in inwardly spaced relation to lips 54, the distance between pipes 42, 44, being such that their beveled cutting edges will engage bottom wall 10 of canister 4 at diametrally opposite points adjacent seam 18 when canister 4 is fitted between lips 54 as shown in FIG. 1.

Encircling supply pipe 42 on top of floating bracket 52 is a conical washer 56 (FIG. 3), the concave surface of which opens upwardly, and bearing against that surface while also encircling pipe 42 is an elastomeric bushing 58 which is embraced by a non-deformable retainer sleeve 60. The upper surface of bushing 58 is beveled outwardly in a direction opposite to that of beveled cutting edge 46 on pipe 42, while the upper margin of sleeve 60 is also beveled and is disposed slightly below the beveled surface of bushing 58. The bottom surface of bushing 58 tapers downwardly for facewise abutment with the concave surface of conical washer 56. Similarly fitted over discharge pipe 44 (FIG. 5) is a conical washer 62 and an elastomeric bushing 64 which is embraced by a non-deformable retainer sleeve 66. The upper surface of bushing 64 is furthermore beveled opposite to cutting edge 46 of discharge pipe 44, while its lower surface is tapered for facewise abutment with conical washer 62. Rigidly affixed to the upper surface of bracket 52, slightly inwardly from pipes 42, 44, are lateral abutments 68 having upstanding surfaces against which nondeformable sleeves 60, 66, bear. Bushings 58, 64, and conical washers 56, 62, are free for axial shifting movement on pipes 42, 44, as is bracket 52. The upper surfaces of bushings 58, 64, are beveled for facewise abutment against the undersurface of bottom wall 10 when canister 4 is fitted between lips 54, while cutting edges 16 are beveled in the opposite direction, so as to approach bottom wall 10 at a substantial angle.

Extending through sleeves 28 on base frame 20 to which they are rigidly secured by nuts 70 are a pair of upstanding tie-rods 72 which carry a drive assembly 73. Tie-rods 72 turn inwardly at their upper ends in the formation of bearing surfaces 74, and journaled on bearing surfaces 74 are a pair of spaced actuating links 75 which at their opposite ends are welded to and interconnected by a cross-rod 76 having an actuating handle or rod 78 projecting perpendicularly therefrom. Cross-rod 76 carries a pair of support brackets 82 which are journaled on cross-rod 76 immediately inwardly from actuating links 75 and are maintained in predetermined spaced relation by a cross-bar 83 which also serves as a stop for actuating rod 78. The disposition of rod 78 and links 75 with respect to one another is such that rod 78 will engage cross-bar 83 after advancing in an arcuate path thereto just after links 75 pass beyond the point at which they are located parallel to rods 72 (FIG. 1). Rigidly fastened to the underside of brackets 82 are drive members 84 each having an inwardly projecting lateral flange 86 and a vertical retaining flange 88. Flanges 88 are spaced apart a distance slightly greater than the diameter of side wall 6 on canister 4 so that when the upper end of canister 4 is fitted between them, lateral flanges 86 will extend over upper rim-forming seam 16. At their rear ends vertical

flanges 88 merge into canted stop plates 90 which engage side wall 6 of canister 4 to locate drive members 84 in the same predetermined position with respect to each canister 4 fitted beneath and in between them. In that position cross-rod 76 will extend diametrally across seam 16.

The contents of canister 4 can be safely withdrawn with the exertion of a minimum amount of manual effort merely by lowering canister 4 toward base frame 20 and fitting its lower seam 18 between lips 54 on bracket 52. Supply pipe 42 and discharge pipe 44, as well as their surrounding elastomeric bushings 58, 64, will then project into the downwardly opening dish-shaped end portion of canister 4 at diametrally opposite points adjacent lower seam 18. At the same time drive assembly 73 is moved upwardly and rearwardly away from the upper end of canister 4 by moving actuating rod 78 away from cross-bar 83 so that drive assembly 73 will not interfere with canister 4 as it is placed upon bushings 58, 64. Next, drive assembly 73 is lowered against canister 4 with lateral flanges 86 of drive members 84 abutting against the upper margin of seam 16 and retaining flanges 88 and stop plates 90 bearing against side wall 6. In this position cross-rod 76 will be centrally disposed above top wall 8 and consequently, when actuating rod 78 is turned toward cross-bar 83, actuating links 75 will move from a somewhat horizontal position to a more vertical position in which they are located approximately parallel to tie-rods 72. As actuating links 75 move toward a vertical position, drive members 84 depress and drive canister 4 downwardly. To gain additional leverage, a short length of ordinary water pipe can be placed over actuating rod 78. During their last increment of movement, actuating links 75 pass beyond a position in which they are parallel with tie-rods 72 and into an over-center locked position wherein actuating rod 78 bears against cross-bar 83 and is thereby restrained from further movement (FIG. 1).

The tie rods 72, which may, for example, be of steel, are sufficiently rigid to sustain the entire weight of drive assembly 73 when elevated, but are flexible enough to accommodate the necessary motion of the links 75.

As canister 4 moves downwardly toward base frame 20, elastomeric bushings 58, 64, will also be forced downwardly along with floating bracket 52 against the bias of coil springs 48. By the time beveled cutting edges 46 on pipes 42, 44, engage bottom wall 10, the beveled upper surfaces of bushings 58, 64, will conform to and form a fluid-tight seal with the undersurface of bottom wall 10. Further advancement of canister 4 causes cutting edges 46 to initially dent bottom wall 10 and thereafter puncture it so as to allow the upper ends of pipes 42, 44, to protrude into the interior of canister 4. When actuating links 75 are in their locked position, springs 48 acting through floating bracket 52 will exert axial compressive forces on bushings 58, 64, which would tend to cause bushings 58, 64, to bow or bulge outwardly at their centers and thereby distort their upper beveled surfaces if it were not for the presence of retainer sleeves 60, 66. Since retainer sleeves 60, 66, snugly embrace bushings 58, 64, for almost their entire height, bushings 58, 64, experience very little distortion and consequently the contour and angle of their upper surfaces are not warped to the extent that the seal is destroyed or rendered less effective. Some distortion of bushings 58, 64, does occur, primarily above the beveled upper margins of sleeves 60, 66. These portions of bushings 58, 64, are unrestrained and tend to spread out along the undersurface of bottom wall 10 in surrounding relation to pipes 42, 44, thereby forming broader and more perfect sealing surfaces. Radially presented inwardly directed forces act upon the lower tapered surfaces of bushings 58, 64, by reason of the presence of conical washers 56, 62, and these forces cause the lower portion of bushings 58, 64, to deform slightly inwardly and tightly embrace the cylindrical surface of supply and discharge pipes 42, 44. In this manner a fluid-tight seal is produced

along the outer surface of pipes **42, 44**, which prevents seepage of fluid through bushings **58, 64**. Accordingly, the only way fluids can be supplied to and withdrawn from canister **4** is through pipes **42, 44**, notwithstanding the fact that bottom wall **10** has been punctured.

Abutments **68** prevent inward shifting movement of elastomeric bushings **58, 64**, as concave bottom wall **10** is forced against them, while sleeves **60, 66**, prevent the elastomeric bushings **58, 64**, from deforming outwardly under the effects of the lateral forces so encountered. The apertures near the ends of bracket **52** for reception of pipes **42, 44**, that permit axial shifting movement of bracket **52** on pipes **42, 44**, maintain pipes **42, 44**, in place and resist a tendency of beveled cutting edges **46** to slide along the concave surface of bottom wall **10**. Inasmuch as elastomeric bushings **58, 64**, are retained within sleeves **60, 66**, they do not deform to any appreciable extent.

When pressurized air or other fluid is supplied to canister **4** through supply coupling **34** and supply pipe **42** the contents will be forced outward through discharge pipe **44** and discharge coupling **36**. Since bushings **58, 64**, are embraced by sleeves **60, 66**, they will not tend to bulge or bow outwardly at their centers and thereby form an imperfect seal with bottom wall **10** or the outer surfaces of pipes **42, 44**, even under pressures of substantial magnitudes such as 90 lbs./in.^{2} absolute. The beveled upper surfaces of bushings **58, 64**, are maintained snugly against bottom wall **10** in surrounding relation to the punctures by springs **48** irrespective of the magnitude of the pressure within canister **4**. Similarly, the seals around pipes **42, 44**, at conical washers **56, 62**, are not destroyed or adversely affected.

In view of the fact the canister tap **2** enters canister **4** through its bottom wall **10** within the inverted recess defined by seam **18**, little danger exists of fumigants or other toxic contents splashing or spraying upwardly into the user's face. The bottom of canister **4** serves as a shield against this hazard, making canister tap **2** far safer to use. When the contents of canister **4** are consumed it is discarded, and another canister **4** is tapped in a similar manner.

It should be noted that the portions of tierods **72** protruding below sleeves **28** can be used to fasten base frame **20** to a suitable supporting structure.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A canister tap comprising a frame adapted to support a canister having canister walls; at least one pipe mounted on said frame and terminating at a cutting edge; means for forcing said cutting edge of said pipe through one of said canister walls so as to establish communication with the interior of said canister through said pipe; a floating member shiftable axially with respect to said pipe; an elongaed deformable seal surrounding said pipe and being axially shiftable thereon; a substantially non-deformable retainer embracing said deformable seal for preventing substantial outward deformation of said seal when said seal is subjected to axial compressive forces; portions of said retainer and said seal being between said floating member and said one canister wall; and bias means for biasing said floating member towards said seal whereby to force said seal against said one canister wall.

2. A canister tap according to claim **1** wherein the seal is an elastomeric bushing which surrounds the pipe and the retainer is a sleeve which embraces the bushing.

3. A canister tap according to claim **1** wherein said one canister wall is dish-shaped, said seal and said retainer each having one end beveled to conform to the shape of said canister wall.

4. A canister tap according to claim **3** wherein an abutment is rigidly mounted on said floating member in juxtaposition to said retainer for resisting the tendency of said seal to slide on the inclined surface of said dish-shaped wall when said canister is forced against said cutting edge.

5. A canister tap according to claim **1** wherein an element having a depressed surface is interposed between said seal and said floating member; one end of said seal being adapted to engage said one canister wall and the other end of said seal being tapered to conform to said depressed surface of said element; whereby said other end of said seal engages said depressed surface and is deformed radially inwardly towards the outer surface of said pipe when said seal is compressed between said element and said one canister wall.

6. A canister tap for a canister having a substantially cylindrical side wall and closed at its ends by top and bottom walls; said canister tap comprising a base frame; a pipe mounted on said frame and terminating at a cutting edge for puncturing said bottom wall of said canister; a drive member mounted in spaced relation from said base frame and adapted to engage said upper end of said canister; a link pivotally mounted at one of its ends to said drive member; a tie member rigidly connected at one of its ends to said base member and pivotally connected at its other end to the other end of said link; and means for swinging said link about its pivotal connection with said drive member for altering the distance between said drive member and said base frame; said tie member being sufficiently rigid to sustain said drive member, but flexible enough to permit said member, but flexible enough to permit said swinging whereby said cutting edge will pierce said bottom wall when said drive member is moved toward said base frame.

7. A canister tap according to claim **6** wherein an elastomeric bushing surrounds the pipe for engaging the bottom wall of the canister in surrounding relation to the puncture formed by the cutting edge.

8. A canister tap according to claim **7** wherein the bushing is shiftably mounted on the pipe, and a spring urges the bushing against the bottom wall.

9. A canister tap according to claim **6** wherein a pair of pipes are mounted on the base frame and their cutting edges puncture the bottom wall adjacent its outer peripheral margin.

10. A canister tap according to claim **9** wherein the bottom wall of the canister is inclined adjacent its peripheral margin, the cutting edges of the pipe are inclined in a direction opposite the direction of inclination of the bottom wall at the point of initial contact, and the bushings are contoured to substantially conform to the incline of the bottom wall at the point of contact.

11. A canister tap according to claim **9** wherein the bushings are shiftably mounted on the pipes, a floating bracket is shiftably mounted on and extends between both pipes, and springs urge the floating bracket against the bushings.

12. A canister tap according to claim **6** wherein said means for swinging said link includes a cross-rod rotatably mounted in said drive member and rigidly connected to said link, an actuating rod rigidly connected to said cross-rod for applying torque to said link, and a stop mounted on said drive member; said link being movable from a released position wherein it is inclined with respect to the longitudinal axis of said canister to a locked position wherein it is located over-center but substantially parallel to the longitudinal axis of said canister; said actuating rod engaging said stop when said link is in its over-center locked position.

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ROBERT B. REEVES, Primary Examiner

H. S. LANE, Assistant Examiner

U.S. Cl. X.R.

137—318

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,526,345 Dated September 1, 1970

Inventor(s) Joseph Carl Dawson, Jay B. Brown and Euel C. Pryor

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 47, "FIG." should read --FIGS.--. Column 3, line 49, "16" should read --46--. Column 5, line 42, "tierods" should read --tie-rods--; line 62, "elongaed" should read --elongated--. Column 6, lines 35 and 36, "but flexible enough to permit said member," should be deleted.

SIGNED AND SEALED NOV 3 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents

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